What Is Claimed Is:

1. A head portion for counterbalancing a random orbital machine, the head portion comprising:

a first element adapted for connection to a drive means for said machine and for connection to an abrasive pad assembly, said drive means rotatable about a first axis of rotation and said abrasive pad assembly rotatable about a second axis of rotation disposed parallel to said first axis of rotation and lying within a common plane therewith; and,

a second element detachably connected to said first element; and,

wherein said first and second elements are configured to at least substantially counterbalance:

portions of said abrasive pad assembly not disposed concentrically about said first axis of rotation; and,

forces to which said abrasive pad assembly is subjected to during use as a result of said abrasive pad assembly engaging with a work surface.

2, The head portion as recited in Claim 1 wherein said first and second elements further comprise first and second centers of mass, respectively; and,

wherein said first and second centers of mass are asymmetrically disposed with respect to a radial plane of said second axis of rotation.

3. The head portion as recited in Claim 2 wherein said abrasive pad assembly is selected from a plurality of abrasive pad assemblies having different configurations, and, wherein said second element is selected from a plurality of second elements, each second element in said plurality of second elements configured, in combination with said first element, to at least substantially counterbalance, for a respective abrasive pad assembly in said plurality of abrasive pad assemblies:

portions of said respective abrasive pad assembly not disposed concentrically of said first axis of rotation; and,

forces to which said respective abrasive pad assembly is exposed during use as a result of said respective abrasive pad engaging with a work surface.

4. The head portion as recited in Claim 3 wherein said plurality of abrasive pad assemblies further comprises a plurality of buffing pads having different diameters.

5. The head portion as recited in Claim 3 wherein said plurality of abrasive pad assemblies further comprises a plurality of abrasive pads having different coefficients of friction.

6. The head portion as recited in Claim 3 further comprising:
means to mechanically fasten said second element to said first element.

7. The head portion as recited in Claim 8 wherein said mechanical fastening means further comprises at least one threaded fastener securing said second element with respect to said first element.

8. The head portion as recited in Claim 7 wherein said mechanical fastening means further comprises first and second spacers disposed interspatially of said first and second elements; and, wherein said at least one threaded fastener further comprises first and second threaded fasteners passing through said first and second spacers, respectively.

9. The head portion as recited in Claim 8 wherein said first and second spacers have a thickness measured substantially parallel to said second axis of rotation, said first and second spacers are selected from a plurality of corresponding first and second spacers, and each said corresponding first and second spacer in said plurality of corresponding first and second spacers has a different said thickness.

10. The head portion as recited in Claim 3 wherein said drive means further comprises a drive shaft and said machine further comprises a housing and a guard assembly adapted for mechanical connection to said housing and having an opening adapted to pass said drive shaft; and, wherein said first element defines a mounting recess and supports within said mounting recess a bearing means defining said second axis of rotation, and said abrasive pad assembly further comprises means for connecting said abrasive pad assembly to said bearing means.

11. The head portion as recited in Claim 10 wherein said recess in said first element further comprises a threaded orifice aligned with said second axis of rotation, said bearing means further comprises, disposed concentrically of said second axis of rotation, first and second bearing races and a bearing spacer disposed interspatially of said first and second bearing races and said first element, and said abrasive pad assembly further comprises:

an interface pad mounting plate disposed concentrically of second axis of rotation and defining a hole aligned with said second axis of rotation;

an interface pad mounting plate retaining shoulder bolt aligned with said second axis of rotation, passing through said hole in interface pad mounting plate, said first and second bearing races, and said bearing spacer, and adapted to matingly engage said threaded orifice in said recess;

an interface pad operatively arranged to connect to said interface pad mounting plate; and,

a buffing pad operatively arranged to attach to said interface pad.

12. A random orbital machine with counterbalancing, the machine comprising:

a drive shaft for said machine rotatable about a first axis of rotation;

a first head portion element adapted to connect to said drive shaft and adapted to provide a rotation means parallel to said first axis of rotation and lying within a common plane therewith;

an abrasive pad assembly adapted for connection to said rotation means and comprising a buffing pad; and,

a second head portion element detachably connected to said first element; and,

wherein said first and second elements are configured to at least substantially counterbalance:

portions of said abrasive pad assembly not disposed concentrically of said first axis of rotation; and,

forces to which said buffer pad is exposed during use as a result of said buffing pad engaging with a work surface.

13. A method for counterbalancing a random orbital machine having an abrasive pad assembly orbiting about a first axis of rotation, rotating about a second axis of rotation parallel to said first axis of rotation, and engaging a work surface, comprising the steps of:

determining a mass for portions of said abrasive pad assembly non-concentrically disposed about said first axis and an angular velocity for said mass;

determining a force associated with said engagement; and,

responsive to determining said mass, said angular velocity, and said force:

selecting a mass and position for a first counterbalancing mass disposed in a first counterbalancing element rotating about said second axis; and

selecting, for a second counterbalancing mass disposed in a second counterbalancing element, detachably connected to said first counterbalancing element, a mass and, in a plane parallel to said work surface, an asymmetrical position with respect to said first counterbalancing mass; and,

wherein said first and second counterbalancing masses are selected to at least substantially counterbalance said mass and said force.